



# Presentation to ASQ

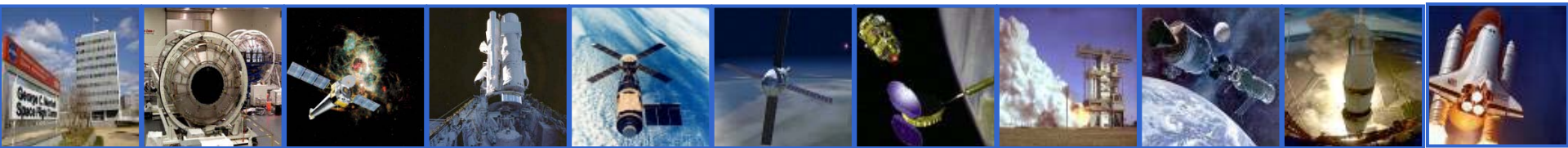
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## ***NASA S&MA at the Crossroads***

***The role of NASA Quality Insight/Oversight  
for Commercial Crewed Launch Vehicles***

*Roy W. Malone, Jr., Director  
MSFC Safety & Mission Assurance (S&MA)*

3/9/10



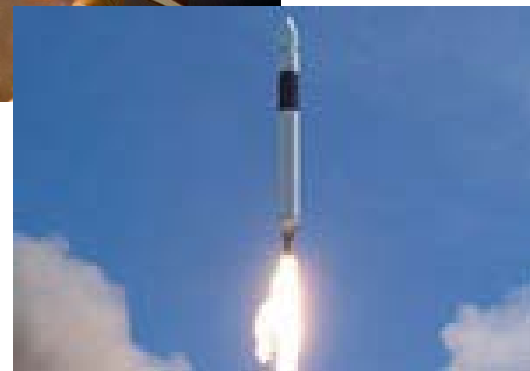




# Agenda

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- The Journey
- Current S&MA Oversight/Insight Model
- The Change
- The Issue
- Potential NASA relationship with Commercial Partners
- Commercial “X” FRR – Are you Go





# Shuttle FRR - Are you Go?

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- **“There has to be an optimum balance among technical performance, time schedule and cost.”**

Dr. Eberhard Rees - Director of Marshall Space Flight Center (March 1, 1970 - Jan. 19, 1973) – speaking to the World Management Congress in Munich in 1972





# The Journey

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- **Following the Space Shuttle Challenger accident, the Rogers Commission reported in 1986:**
  - S&MA was not included in technical issue discussions.
  - Inadequate S&MA staffing at MSFC – “Reductions in the safety, reliability and quality assurance work force at Marshall and NASA Headquarters have seriously limited capability in those vital functions (safety program responsibility) to ensure proper communications.”

*“A properly staffed, supported, and robust safety organization might well have avoided these faults (addressing faults within the S&MA organization that contributed to the Challenger Accident)....”*





# The Journey (cont.)

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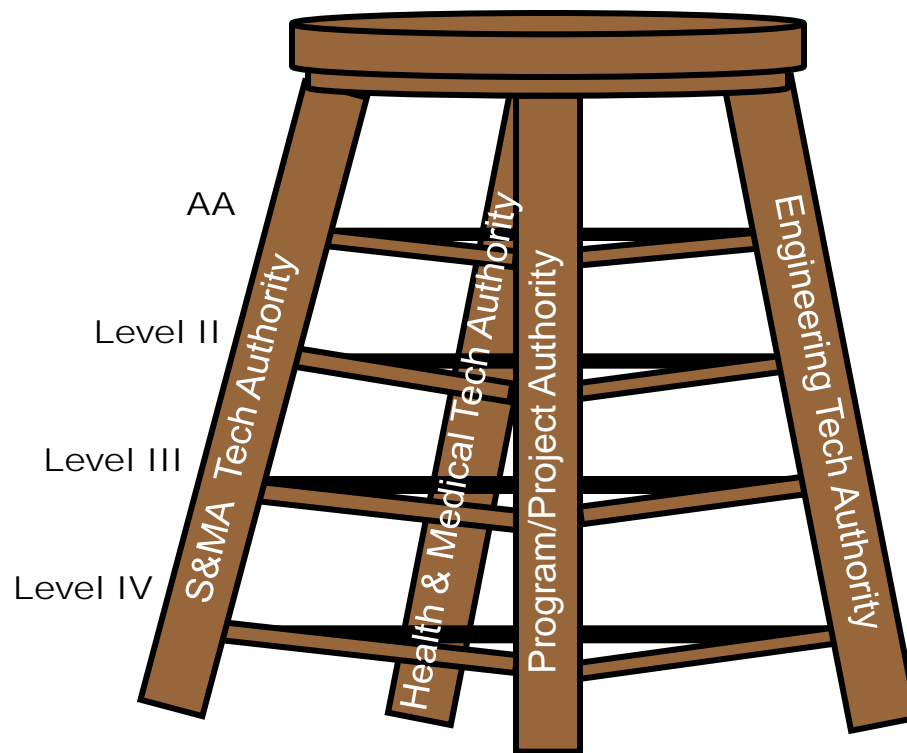
- **Following the Space Shuttle Columbia accident, the Columbia Accident Investigation Board (CAIB) reported in 2003:**
  - “Throughout its history, NASA has consistently struggled to achieve viable safety programs and adjust them to the constraints and vagaries of changing budgets”
  - “The Board believes that the safety organization, due to a lack of capability and resources independent of the Shuttle Program, was not an effective voice in discussing technical issues or mission operations pertaining to STS-107.”





# Current NASA Oversight/Insight Model

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**Technical Authority**

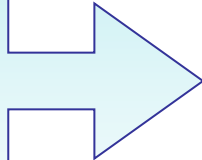




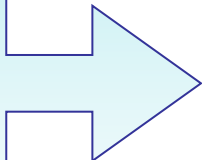
# Current S&MA Oversight/Insight Model

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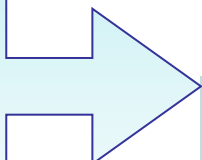
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SRM&QA



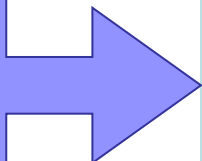
MSFC Prime  
Contractor Onsite  
SRM&QA



Defense Contract  
Mgt. Agency  
Onsite (DCMA)



Prime  
Contractor  
SRM&QA



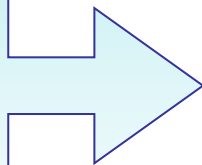
- AS9100 Registration / Compliance
- Procurement Quality
- Hardware Qualification & Acceptance
- Manufacturing & Test Quality
- Assure Requirement Compliance
- Control of Nonconforming Material
- Industrial Safety Monitoring
- Program Critical Hardware Moves



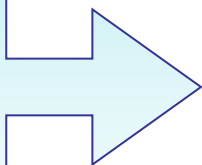
# Current S&MA Oversight/Insight Model

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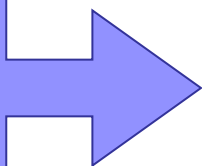
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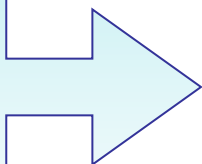
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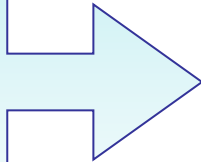
- Procurement Quality Surveillance
- Hardware Qualification & Acceptance
- Manufacturing & Test Quality GMIPS
- Assure Requirement Compliance
- Control of Nonconforming Material MRB
- Industrial Safety Monitoring
- Program Critical Hardware Moves



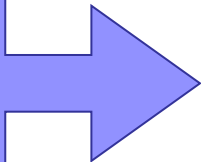
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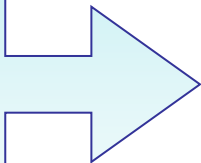
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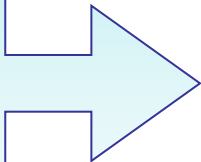
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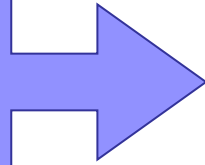
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- Procurement Quality
- Hardware Qualification & Acceptance DD 250
- Manufacturing & Test Quality
- Assure Requirement Compliance
- Control of Nonconforming Material MRB
- Industrial Safety Monitoring
- Program Critical Hardware Moves



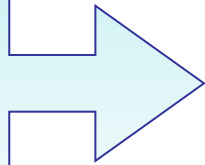
# Current S&MA Oversight/Insight Model

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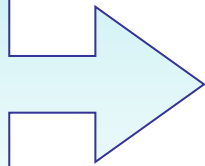
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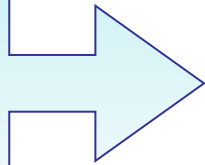
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- **Flight Readiness (Element Reviews, Launch Support, Post-Flight Assessment)**
- **Material Review Board Disposition**
- **FMEA / CIL / Hazard Reports Approval & Safety Panel Reviews**
- **Design Reviews/Technical Interchange Meetings**
- **Contract Monitoring and Evaluation**
- **Change Evaluation/Boards**
- **NSRS / Safety Concern Reporting**
- **COQ Approval**
- **Problem Reporting and Corrective Action**
- **Failure / Mishap Investigations**
- **Contractor and Subcontractor Audit / Assessments**



# Space Shuttle S&MA Flight Readiness Certification

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## S&MA actively participates in the SSP Flight Certification process

- NSTS 08117, Appendix Q identifies the flight readiness endorsement statements that MSFC S&MA must certify
- In summary, MSFC S&MA certifies flight readiness for the following areas:

**Hazard Analyses**

**Surveillance**

**LCC's**

**FMEA/CIL**

**As-built vs. As-designed**

**IFA's**

**Design Verification**

**NCR's / PRACA's**

**Waiver's/ Dev's**

**Risk Analysis (e.g., PRA)**

**MRB's**

**Limited Life Items**

**Audits**

**GMIP's**

**Acceptance Reviews**

**GIDEP's**

***MSFC S&MA's ability to certify the above endorsements requires active participation in each of the above areas***



# The Change

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## NASA FY11 Key Budget Points

- \$6 billion increase over five years to spur the development of American commercial human spaceflight vehicles and increase technical innovation
- Intends to cancel the Constellation program including Ares I, Ares V, Orion and Altair
- Adds \$600 million to fund the Shuttle's remaining flights, with funds available to extend Shuttle through the first quarter of FY2011, if necessary





# The Issue

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- What should be the NASA S&MA role with respect to commercially developed launch vehicles/spacecraft flying NASA crews?



**“Let’s face it, space is a risky business. I always considered every launch a barely controlled explosion.”**

Aaron Cohen, Former JSC Center Director, Acting NASA Deputy Administrator, 1992



# Commercial Vehicle X FRR Are you Go?

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# Launch Vehicle Human-Rating Certification Fundamentals

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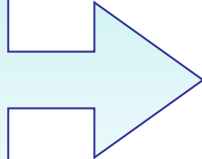
- 1. Define a requirements set that would yield an “acceptable level of safety”**
- 2. Assurance that the design solution meets these requirements**
- 3. Assurance that products (h/w and s/w) are consistent with the approved (*deemed acceptable*) design solutions**
- 4. Flight test demonstrations to build confidence prior to initial launch of NASA crews**
- 5. Complete a Flight Readiness certification process**
- 6. Post-flight assessment process is in place**



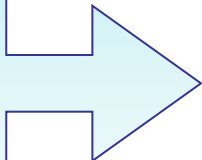
# NASA S&MA Oversight/Insight

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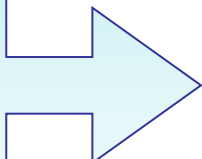
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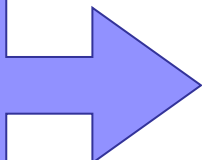
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# **Amount of NASA Oversight/Insight**

## ***Things to Consider***

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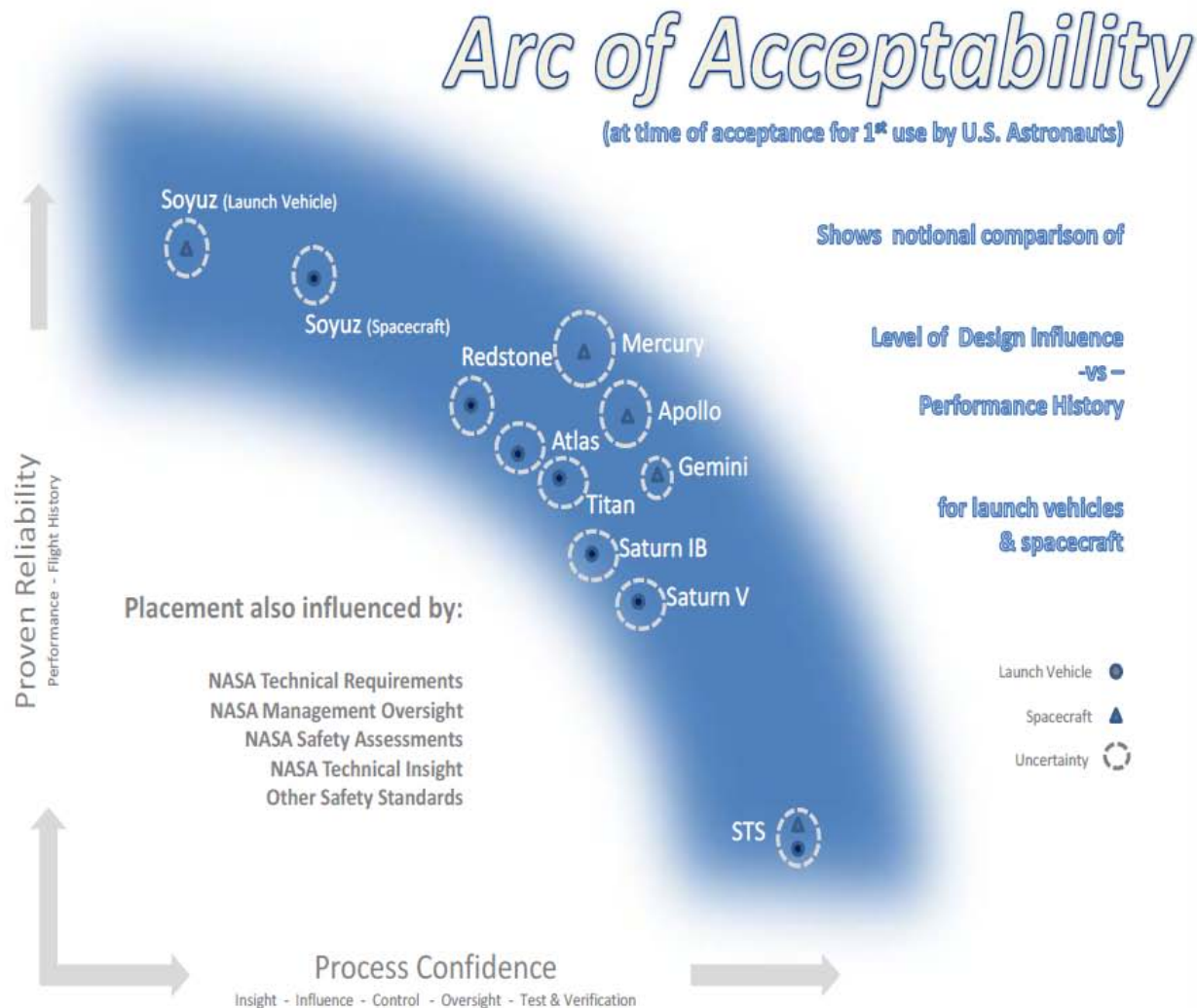
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- **Quality issues with DOD Aerospace products**
- **Ever increasing issues with counterfeit parts**
- **Experience/Track Record of Commercial Vendor**
  - **Toyota**
- **Production capability limitations**
  - **Production rate**
  - **Infrastructure availability**
- **Roll of other Federal Government Agencies - FAA**
- **Demonstrated reliability of vehicle**



# Demonstrated Reliability vs Insight/Oversight

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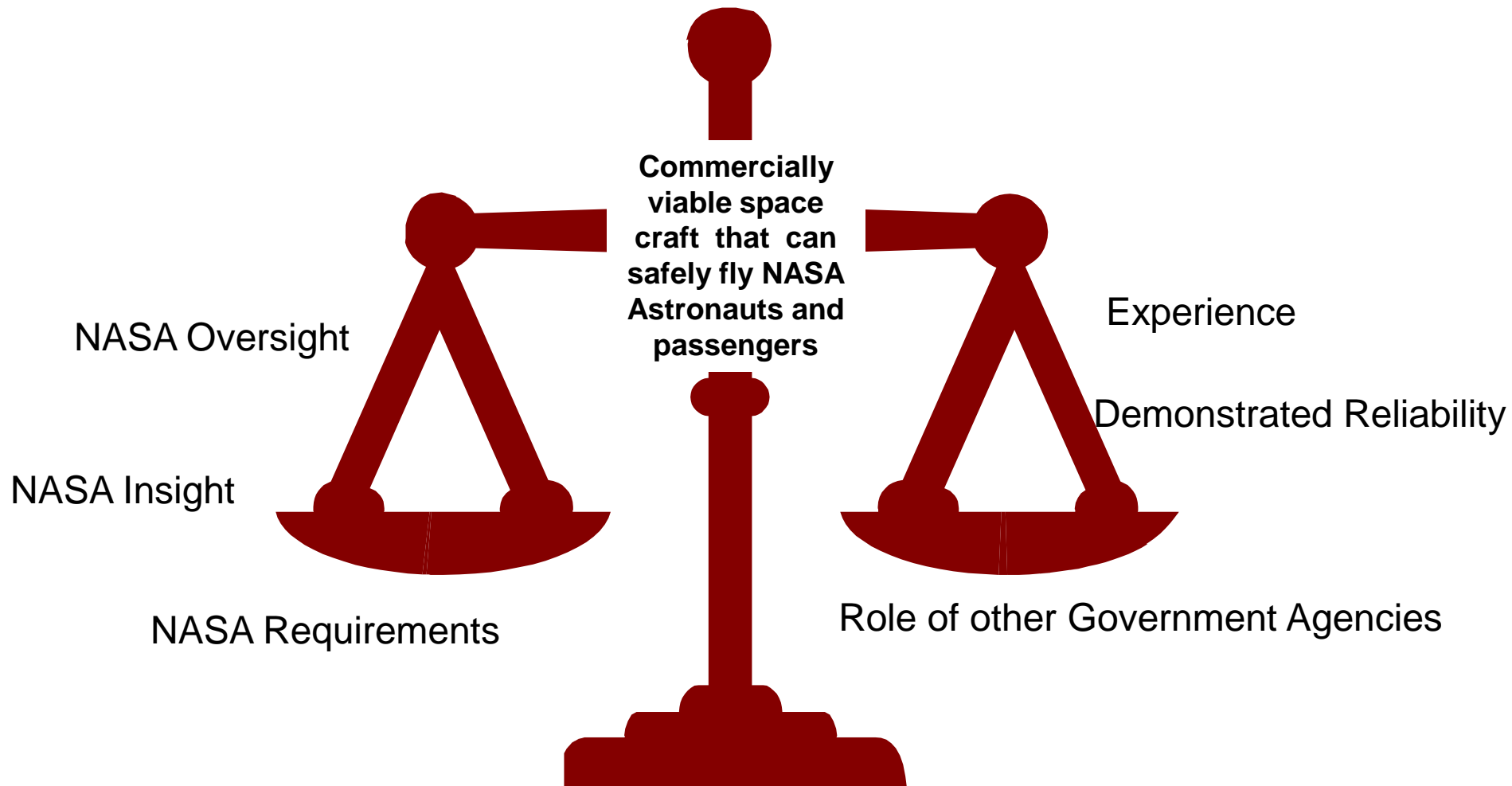






# What is the proper balance?

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# Can you answer the Go – No Go question?

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## Questions?

- **“If eternal vigilance is the price of liberty,  
then chronic unease is the price of safety.”**

Professor James Reason

